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EVALUATION OF MOUNTAIN PINE BEETLE INFESTATIONS ST. JOE NATIONAL FOREST, IDAHO 1959

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EVALUATION OF MOUNTAIN PINE BEETLE INFESTATIONS ST. JOE NATIONAL FOREST, IDAHO 1959

Archibald Tunnock, Jr., Entomologist
Division of Forest Insect Research

Survey records show active infestations of the mountain pine beetle (Dendroctonus monticolae Hopk.) in western white pine stands (Pinus monticola Dougl.) on the St. Joe National Forest, Idaho since 1934. A gradual increase in the beetle population has been apparent since 1951, when an average of 0.3 percent of the white pine trees were killed on a forest-wide basis. In 1958, 1.1 percent of the trees examined in white pine stands east of Avery, Idaho were infested.

A biological evaluation of current mountain pine beetle infestations east of Avery was made by personnel from the Missoula Forest Insect Laboratory during September 1959 within a 2,500-acre area that extended from the mouth of Sisters Creek along the St. Joe River to Bottle Creek. The purpose of this evaluation was to record biological and physical characteristics of the infestations and by analysis of data determine their potential destructiveness. In addition, current tree mortality within the stands examined was estimated as a percentage of infestation of all the trees checked for beetles during the evaluation.

METHODS

The main problem during evaluation was to locate trees that had been attacked in 1959. Currently attacked trees were sought out by meandering through pine stands that contained chronic infestations and checking each tree encountered for signs of attack. A record was kept of total trees examined for beetle brood throughout the evaluation.

Trees containing beetle brood were examined by removing a total of 2 square feet of bark at breast height on the bole (6 x 12-inch sections from four sides) to expose the beetle brood. Counts were made of (1) the numbers of brood in each stage of development, (2) the number of egg galleries (attacks), and (3) the numbers of natural enemies[1/]. In addition, the diameters of the trees and any injuries[2/] that weakened them previous to attack were recorded.

1/ Insects belonging to the orders Hymenoptera (wasps), Diptera (flies), and Coleoptera (beetles).

2/ Injuries consisted of white pine blister rust (Cronartium ribicola Fischer), wind or snow breakage, rots, and lightning strikes.

A formula developed by Bedard and Terrell[3/] in 1939 for predicting the trend of mountain pine beetle infestations in western white pine stands was chosen as the tool for analysing biological data. This formula produces an index figure from which a prediction can be made of the ratio of trees to be attacked the following year to the number attacked currently. The index derived by the formula is based largely upon probable survival of various pine beetle brood stages, sex ratio of the current population, and expected mortality of beetles during their flight after emergence from trees. Predictions based on this formula are usually conservative, that is, they generally overestimate the number of trees to be attacked in the area under study.

RESULTS

The major results of the evaluation are summarized in table 1. The tabulation presents statistics for the years 1958 and 1959 on the number of pine trees examined, those found to be currently infested, those injured prior to being attacked by the beetles, abundance of insect parasites and predators, and the biological index of the current infestation.

Table 1.--Biological factors affecting the trend of mountain pine beetle infestations in white pine timber during 1958 and 1959 on the Avery Ranger District, St. Joe National Forest

	1958	1959
Trees examined	3,157	1,435
Trees infested	35	24
Average percentage of trees infested (weighted)	1.40	1.58
Infested trees injured prior to attack		
Total number injured	21	16
Percentage of total infested	60	67
Natural enemies:		
Hymenopterous (wasp-like), per sq. ft. of bark	1.2	0.6
Coleopterous (beetles), per sq. ft. of bark	0.8	0.1
Dipterous (flies), per sq. ft. of bark	2.1	1.8
Biological index	2.3	1.2

3/ Bedard, W. D., and Tom T. Terrell. A method for predicting the trend of mountain pine beetle infestations in western white pine. Unpublished report of the Forest Insect Laboratory, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Coeur d' Alene, Idaho. 1939.

Mountain pine beetles infested an average of 1.6 percent of 1,435 white pine trees examined on the Avery Ranger District in 1959. This was an increase of 11 percent over the number of trees infested in 1958 within the same area. This increase did not fulfill the 1958 prediction that 2.4 percent of the trees would be infested by 1959. Logging in several drainages surveyed last year probably decreased the beetle population to some extent, but as previously mentioned, minor differences between predicted and actual percentages of trees killed can occur when using the biological index.

Beetles seemed to show some preference in both 1958 and 1959 for trees weakened [2/] prior to attack over those that were not injured. Approximately two-thirds of the trees killed by beetles in both years were those previously injured. The apparent preference of the beetle for this type of tree might be explained by the high incidence of blister rust in the old-growth white pines in the beetle-infested stands east of Avery.

Hymenopterous (wasps), Coleopterous (beetles), and dipterous (flies) insects that reduce beetle broods by feeding upon them were not abundant enough to affect the current populations of beetles. These enemies together averaged only 2.5 per square foot of bark in 1959, as compared to 4.1 per square foot counted in 1958.

The biological index was computed to be 1.2 in 1959. The index implies that for every tree attacked in 1959, 1.2 trees of similar size may be attacked in 1960 within the presently infested areas.

DISCUSSION

The mountain pine beetle has been killing old-growth white pine trees within the St. Joe National Forest since the 1930's. The beetle will probably continue to deplete these virgin pine stands at the present rate as long as they remain in an undeveloped state. Experience has indicated that beetle infestations diminish as utilization of old-growth pine forests increases. This results from (1) converting stands to younger age classes less susceptible to attack, or (2) salvaging infested trees before the beetles emerge.